UN

CONFERENCE ON DISARMAMENT

CD/1128
CD/CW/WP.385
20 February 1992

Original: ENGLISH

AUSTRALIA

TRIAL INSPECTION OF A SCHEDULE 3/ "OTHER RELEVANT" FACILITY

Introduction

It has been accepted since the late 1960's that some parts of the civil chemical industry will have to be monitored under the provisions of a Chemical Weapons Convention (CWC), to provide the necessary confidence that chemical industry is not involved in the clandestine production of chemical weapons. In particular, the verification of "Non-Production" of chemical weapons in the civilian chemical industry has been a particular focus of attention.

In Appendix I of the current Rolling Text (CD/1116), there are provisions for on-site inspections of those parts of chemical industry that produce, process or consume chemicals in Schedule 2 (above a specified threshold). Discussions concerning the elaboration of provisions to monitor facilities that produce, process or consume Schedule 3 chemicals are continuing, and indeed have been the focus of much of the work undertaken in Working Group B in 1991.

Within the civil chemical industry, there are many facilities that are not involved in the production, processing or consumption of any of the chemicals in Schedules 1, 2 or 3, and hence not declared under the current provisions of the CWC, that would be capable of producing at least some of those chemicals. In 1991, work was undertaken in developing provisions for routine on-site inspections of these "CW-capable" or "Other Relevant" facilities, and the results of this are contained in Appendix 2 to the current Rolling Text. As well, two recent Working Papers, one By Sweden (CD/1053) and one by a group of eight nations (Egypt, Ethiopia, Indonesia, Iran, Kenya, Nigeria, Pakistan and Yugoslavia) (CD/348) have offered suggestions on the possible form of on-site inspections at short notice for Schedule 3 and "Other Relevant" facilities.

* * * *

GE.92-60373

As part of Australia's Chemical Weapons Regional Initiative, a Workshop for Government chemists was held at the Australian Defence Science and Technology Organisation (DSTO) Materials Research Laboratory (MRL) between 26-30 August 1991. One of the activities of this workshop was a Trial Inspection of a Schedule 3 or "Other Relevant" Chemical Facility. One of the objectives of the inspection was to familiarise the participants of the workshop on the possible form of routine qualitative inspections of Schedule 3 and other "Other Relevant" facilities to be carried out under the future CWC.

The Trial Inspection was conducted by Australia. Participants from Brunei, Federated States of Micronesia, Fiji, Indonesia, Kiribati, Laos, Malaysia, Myanmar, New Zealand, Philippines, Papua New Guinea, Singapore, Solomon Islands, Thailand, Vanuatu and Vietnam observed the conduct of the inspection.

This inspection is described in the remainder of this working paper.

Objectives of the Inspection

The basic objectives for the verification regime to cover these facilities should be:

a. to deter the covert production, in chemical industry, of Scheduled chemicals which may then be used for CW purposes; and

b. to provide assurance to States Parties that other States Parties are not using their chemical industry in violation of the CWC.

In our view, these objectives may best be realised for Schedule 3 or Other Relevant Facilities, by using the plantsite as the unit of declaration and inspection. In order for this inspection regime to be both effective and cost-effective, the inspection of the plantsite would need to be carried out in a reasonably short time, preferably within one working day, without a prior "facility agreement".

With this in mind, the trial inspection was conducted with a view to:

. investigate the feasibility of inspecting a chemical plantsite without a previously agreed "facility agreement";

. determine whether the activities observed at the inspected plantsite were consistent with the information provided by the company during an initial briefing to the inspection team;

. look for any unusual features that could be suggestive of the company violating the CWC; and

. check for the presence of any undeclared Scheduled chemicals

- and if present, check whether the presence of that chemical was consistent with legitimate activities below the reporting threshold.

Conduct of Inspection

Briefing by Company Staff

Upon arrival at the site, the inspection team was given a brief history of the company and a general outline of its current activities by the Managing Director of the company.

The production manager then gave a technical description of the raw materials, the finished products, the manufacturing processes used on the site, using a site plan as a guide. The inspection team were advised that the company consumed more than 30 tonnes of Triethanolamine per year. Triethanolamine is currently listed in a footnote to Schedule 3 in CD/1116. Depending on the ultimate placement of Triethanolamine, this facility may be either a Schedule 3 or "Other Relevant" facility under the future CWC.

In summary, the team was told that:

. the site covered an area of approximately two hectares;

. approximately 120 staff were employed at the site;

. the facility undertook both formulation and chemical reactions (acid-base); and

. at the time of the inspection there were 3.2 tonnes of Triethanolamine on the plantsite.

In response to a question from the inspection team leader, the production manager stated that there was no Thionyl Chloride at the site.

Development of the Inspection Plan

Making use of the site plan and the information that had been provided by the company officials during the briefing, the inspection team (team leader and chemical engineer) then developed an inspection plan, in consultation with the company technical manager and production manager.

. The development of the plan took 15-20 minutes.

It was agreed that the inspection would focus on the Therapeutical Plant, the Main Production Area, the "Former Chlorination Plant" and the centralised Waste Effluent plant. The company agreed that company staff would take samples for the inspection team from quality control sampling points or other agreed sampling points, provided the analysis methods used by the team were designed to indicate the presence or

absence of Scheduled chemicals and provided no information on chemicals that are not relevant to the CWC. The company also agreed that the team could use a portable ion mobility spectrometer vapour detector (Chemical Agent Monitor, CAM) to monitor for the presence or absence of vapours of certain Schedule 1 chemicals.

It was further agreed that the inspection plan would be flexible, allowing the inspection team to walk through other parts of the plantsite, but that the inspection team would confine itself to the negative proof approach and would be no more instrusive than necessary in order to satisfy itself that the company was not involved in activities that would be in violation of the CWC.

The inspection team were also advised of the safety regulations in operation at the plantsite.

Details of the Inspection

1. Therapeutical Plant

The inspection team walked from the reception area to the Therapeutical Plant and observed the operations within this plant.

The Chemical Agent Monitor (CAM) was used to monitor the effluent air from this plant.

A random sample was requested from the raw materials storage area of this plant.

Result - The Therapeutical Plant was observed to be a modern production area operating at positive pressure - the team's chemical engineer commented that the plant could readily be converted to operate at negative pressure. There was no CAM response, and the analysis of the sample did not indicate the presence of any Scheduled chemicals.

2. Main Production Area

The inspection team walked through the "Main Production Area (MPA)", observed the operations within the MPA, requested a random sample from one of the several Stainless Steel reaction vessels, and requested a random sample from one of the product storage tanks.

Result - It was observed that there was no forced or induced ventilation in the MPA. The workers were wearing protective hats and corrosive-resistant gloves, but there were no signs of any gas masks or other protective clothing.

3. Dry Powder Area

The inspection team walked through and observed the operations being conducted in the "Dry Powder Area".

Result - The team observed nothing that it considered relevant to the objectives of the inspection in this area, and did not request that any samples be taken for analysis.

4. Former Chlorination Plant

The inspection team inspected the "Former Chlorination Plant", observed any operations being conducted in this plant, monitored the plant with a CAM, and took a wipe sample from this plant.

Result - This plant was idle at the time of inspection. There was no CAM response, and no indication of any activities with toxic chemicals. The analysis of the wipe sample did not indicate the presence of any Scheduled chemicals.

5. Waste Effluent Plant

The inspection team inspected the Waste Effluent Plant, monitored the headspace with the CAM, took a headspace sample with a Tenax tube, and took a waste water sample.

Result - There was no CAM response. The analysis of the headspace and waste water samples did not indicate the presence of any Scheduled chemicals in the samples.

6. Storage Areas

The inspection team walked through the Finished Goods Store (FGS), the open air raw materials storage area, and the open drum storage area. Several of the storage drums were monitored with the CAM (the CAM inlet was held approximately 20mm from the closed caps of the drums).

Result - The FGS had natural ventilation. A fork lift driver in the FGS was not wearing any protective clothing.

The quantity of storage drums labelled Triethanolamine observed in the raw materials storage area was consistent with the company information that there were 3.2 tonnes of this chemical on the site at the time of the inspection.

No drums of Thionyl Chloride were observed in the storage area. A CAM response was obtained from near the closed filling cap of one of the drums in the open drum storage area. A sample was requested - subsequent analysis indicated that the sample did not contain any Scheduled chemicals (see Annex 1). The team concluded that the CAM had recorded a "false alarm".

7. Laboratories

The inspection team walked through and observed the features and operations of the quality control laboratory, and walked down the corridor of the building containing the R & D laboratory. The team looked through the doorway into, but did not enter, the R & D laboratory.

Result - The inspection team concluded that there was no evidence that the laboratories were configured for the handling of toxic chemicals, nor did they have any features that could be suggestive of the company violating the CWC.

8. Sick Bay

The team leader was shown the sick bay.

Result - The sick bay was observed to be a small room containing a small bed and a small medicine cabinet. There were no medicines or therapies related to the treatment of poisoning by chemical warfare agents, or any breathing apparatus.

Conclusions

The inspection team concluded that, provided the inspection team contained an appropriately trained and experienced chemical engineer and chemist, it was possible to develop an appropriate inspection plan for a chemical plantsite, within a reasonably short time (15-20 minutes).

By the conduct of an inspection based on this inspection plan, the inspection team concluded that all of the activities that were observed during the inspection were consistent with the consumption of the declared quantity of Triethanolamine, and were consistent with the information received from the company staff during the initial briefing. The inspection team was satisfied that the company was not involved in activities that would be in violation of the CWC.

The actual inspection took approximately 1.5 hours, and the analysis of the samples approximately 2.5 hours.

At the conclusion of the inspection, the production manager of the inspected plantsite commented favourably on the conduct of the inspection, noting that there had been no loss of production because of the inspection, and that the company was satisfied that the inspection team had taken the necessary measures with regard to the protection of confidential information and data.

Participants of the workshop noted with interest the conduct of the inspection.

ANNEX 1 - CHEMICAL ANALYSIS

As discussed in a recent report of the Technical Instrumentation Group (CD/CW/WP,306), it is anticipated that the sample preparation and analysis of samples in this type of inspection under the CWC will normally be conducted on-site, using equipment brought to the inspection site by the inspection team.

MRL has purchased a small Gas Chromatograph-Mass Spectrometer (GC-MS) system, that is to be installed in a vehicle, to enable on-site analysis of inspection samples. As the GC-MS has not yet been vehicle-mounted, the samples were taken from the inspected facility to MRL for analysis.

The analysis of the samples by GC-MS was undertaken using the approach described in CD/CW/WP.353, namely, the GC-MS was used as a rapid screening technique to indicate the presence of Scheduled chemicals, and provided no information on chemicals that are not relevant to the CWC.

Prior to analysis, a 1.0 ml aliquot of each liquid sample was extracted with 1.0 ml of HPLC grade dichloromethane. This extract was dried by passing it through a small column of anhydrous Na_2SO_4, and a 1.0 microlitre splitless injection of this solution was used for GC-MS analysis. A 25m 0.33mm I.D. BP5 capillary column, temperature programmed from 50° to 250°C/min, was used for the analysis. Tenax air samples were analysed by thermal desorption-GC-MS using similar GC conditions.

The mass spectrum corresponding to each GC peak was compared with a library of mass spectra of Scheduled chemicals to determine the presence or absence of Scheduled chemicals, using the approach outlined in CD/CW/WP.353. No undeclared Scheduled Chemicals were detected in any of the samples obtained during the inspection.

Had this been a normal trial inspection, no further analysis of samples would have been performed. However, as part of the Workshop, additional laboratory analysis of the samples was undertaken as a demonstration of other relevant techniques. Analysis of samples by Infrared (IR) and Nuclear Magnetic Resonance (NMR) Spectroscopy was performed, again, to check for the presence or absence of Scheduled chemicals. The workshop participants noted that this additional analysis would not normally be undertaken unless there was an ambiguity, for example, in the GC-MS results.